

# Toddler's fracture

B P Shravat, S N Harrop, T P Kane

## Abstract

**"Toddler's fracture" can be difficult to diagnose but should be suspected whenever a child presents to the accident and emergency department with a limp or fails to bear weight on the leg. Irritable hip and subacute osteomyelitis must feature in the differential diagnosis. The history may or may not include an obvious traumatic episode. Rather than fracture, elastic bowing of the bone and consequent periosteal stripping may explain symptoms in some cases.**

(J Accid Emerg Med 1996;13:59-61)

Key terms: limping child; missed fracture; toddler's fracture.

The term, "Toddler's fracture" is used to describe "an undisplaced fracture of the distal tibial shaft in patients in the age group from 9 months to 3 years, when weight bearing is just beginning."<sup>1</sup> The fracture often extends more proximally.

We present a retrospective review of 21 patients and confirm that this condition may be misdiagnosed by an inexperienced SHO in the accident and emergency (A&E) department. This is because clinical and radiological findings may be obscure, and the trauma responsible appears slight. A department which sees 72 000 new patients of all ages annually may expect to encounter approximately one such patient per month.

## Methods

A retrospective two year review was conducted from the medical records of patients with the diagnosis of toddler's fracture, including the history and nature of trauma described and the initial diagnosis and treatment in the A&E department at the Victoria Hospital, Blackpool. This included the consultant radiologist's report on initial and subsequent follow up x rays. The radiographs were reviewed independently by a consultant radiologist (TPK). In conformity with Dunbar *et al*<sup>1</sup> we excluded patients less than 9 months or more than 3 years old.

## Results

A total of 21 children with toddler's fracture attended the A&E Department between the 1st November 1992 and the 31st October 1994. The youngest patient was aged 11 months. The oldest was aged 3 years. During the same period and in the same age group one child was admitted in the hospital with displaced tibial shaft fracture, 12 children were admitted with the diagnosis of irritable hip, and none with acute osteomyelitis of the tibia. During this

period 144 000 new patients of all ages attended the department; the incidence was thus one toddler's fracture per 6800 patients.

## HISTORY AND NATURE OF TRAUMA

Nine out of the 21 children had a definite history of trauma (fell down stairs, fell down stairs with mother, fell off a slide, caught leg in the bars of high chair) causing immediate concern to the parents. In 10/21 cases the parents had dismissed the incident (tripped over, fell off a bottom step, fell off a settee, fell off a coffee table) as trivial at the time of injury. In two cases the parents were not aware of any unusual fall. We were unable to correlate the extent of injury disclosed by x ray with the type of injury mechanism. The presenting symptom in each case was "unable to weight-bear", apart from one child whose complaint was "limping for one week".

## MISSED FRACTURE

A "missed fracture" was said to have occurred if the diagnosis had not been made when initially seen in the hospital by a medical practitioner.<sup>2</sup> This occurred in 6/21 cases and the patient did not receive plaster cast immobilisation as an initial treatment. Three of these patients were reviewed by arrangement the following day, at the request of the examining doctor. Three patients returned spontaneously. One of them was unable to weight bear at three days. Two returned at nine and 15 days respectively because of persistent limp.

## INITIAL DIAGNOSIS TREATMENT AND INDEPENDENT REVIEW OF RADIOGRAPHS

In 11/21 cases the initial diagnosis of the examining doctor was toddler's fracture (fig 1). In 4/21 cases it was "possible toddler's fracture". One child had bilateral toddler's fracture. Each of these 15 patients was treated in an above knee plaster cast.

Independent review of the initial radiographs, by a consultant radiologist (TPK), confirmed a definite fracture in the 11/21 cases where the senior house officer (SHO) had made a firm diagnosis of fracture. In the 4/21 cases where the SHO had made a diagnosis of possible fracture, the fracture was definite in one case, doubtful in two, and not evident in one.

The follow up radiographs in the two doubtful cases showed healing fracture lines with periosteal reaction. In the case where the initial radiograph showed no fracture, the follow up radiograph showed a periosteal reaction with no evidence of fracture.

In 6/21 cases the initial diagnosis of the examining doctor was "soft tissue injury". These patients did not receive plaster cast

Blackpool Victoria  
Hospital NHS Trust,  
Whinney Heys Road,  
Blackpool FY3 8NR:  
Department of  
Accident and  
Emergency Medicine  
B P Shravat  
S N Harrop

Department of  
Radiology  
T P Kane

Correspondence to:  
B P Shravat FRCS Ed.



*Fig 1 Antero-posterior and lateral radiograph of the tibia showing oblique hair line fracture in the distal shaft.*

immobilisation as an initial treatment. They were categorised as missed fracture. On their initial  $x$  rays the consultant radiologist (TPK) reported doubtful fracture in one case and no fracture in five cases. The follow up radiographs of the doubtful fracture showed a healing fracture line with periosteal reaction. The follow up radiographs of the five cases with no fracture confirmed on the initial films were reported in four cases to show a periosteal reaction along the shaft of tibia with no evidence of fracture (fig 2). The finding in the fifth case was of periosteal reaction with healing fracture.



*Fig 2 Ten days follow up antero-posterior and lateral radiograph of the tibia showing periosteal reaction; initial film was normal.*

## Discussion

The relatively trivial mechanism of injury is deceptive in these patients. All but two had a history of injury but this had initially been dismissed as trivial by the parents in 10/21 cases. The inexperienced duty doctor is presented with a real problem of diagnosis when confronted with a child who cannot bear weight on the affected lower limb. The physical signs are subtle. Local swelling or bruising are usually absent.

Clinical localisation of the lesion is all the more difficult when a small child cooperates poorly with examination. Local tenderness is not a consistent finding. Gentle attempts to stress the tibia by axial torsion may elicit a diagnostic response but this can be difficult to determine against a background of crying and resistance to examination.

A good quality  $x$  ray of the tibia may show a faint hair line fracture (fig 3) but this could be missed. Indeed, initial  $x$  rays of toddler's fracture may be entirely normal. This was the case in 6/21 of our patients.

We are aware of a distinction between a spiral, cortical fracture, where control of pain due to rotational strain requires an above knee plaster, and a medullary fracture where a below knee plaster ought to suffice. However, the  $x$  rays may not always be interpreted with sufficient accuracy to allow this distinction. We have preferred to treat this injury in an above knee plaster rather than a below knee slab or cast both in suspected and confirmed cases. This may not be absolutely necessary in all cases. However, parents expected effective relief of their children's pain from a first treatment. They were happy to accept the more extensive plaster and the children were not incapacitated. In contrast, some children were still limping at 3, 9, or 15 days before plaster was applied for a missed fracture. Their review radiographs showed extensive periosteal



*Fig 3 Antero-posterior and lateral radiograph of the tibia showing hair line oblique fracture in the distal shaft.*

calcification even though initial x rays did not show a fracture line.

We judged that a fracture had been missed if a follow up film showed periosteal calcification, even if no fracture was visible when the initial films were reviewed. However, if initial anteroposterior and lateral views do not disclose a fracture, alternative views are unreliable and a fracture line may never be clearly shown.<sup>1</sup> The extent of periosteal calcification observed in some of our cases suggests that, in some cases of apparently missed toddler's fracture, the true lesion may have been produced by elastic bowing of the bone and consequent periosteal stripping. This would not have been apparent on initial radiography.

Although the nature of the responsible injury may appear slight, and may have been dismissed as trivial, it is essential, when the cause

of limp cannot be conclusively identified by x rays, to elicit a compatible history of trauma before accepting the diagnosis of toddler's fracture. If there is no history of injury, care must be taken to exclude inflammatory or infective causes such as irritable hip or osteomyelitis. In particular, significant infection of bone may be present even when local examination, temperature, x ray, and white cell count are normal. A raised ESR confirms the need for admission and further investigation.<sup>3</sup>

1 Dunbar JS, Owen HF, Nogrady MB, McLeese R. Obscure tibial fracture of infants – the toddler's fracture. *J Can Assoc Radiol* 1964;15:136–44.

2 Parker MJ. Missed hip fractures. *Arch Emerg Med* 1992; 9:23–7.

3 Gavalas M, Potts H, Galasko CSB. Bone infection and the limping child in the accident & emergency department: a diagnosis to be considered. *Arch Emerg Med* 1992;9: 323–5.

---

**Department of Emergency Medicine, Catholic University of Leuven,  
on behalf of the European Society for Emergency Medicine**

## **Course**

### **Concepts and Developments in Emergency Medicine**

This course will be held at the Huis van Chièvres-Faculty Club, Leuven, Belgium, from May 29 to June 5 1996. The official language is English and the purpose of the course is to provide a global overview of concepts and recent developments in emergency medicine. Course fee: 40.000 Belgian francs.

Further details: The secretary of the Department of Emergency Medicine  
University Hospital Gasthuisberg  
Herestraat 49, 3000 Leuven, Belgium  
Tel. +32 16 343927  
Fax +32 16 343894